

AD-A130 247

COMPLETION OF THE FIRST ENLISTMENT BY FEMALE PERSONNEL: 1/1
A PREDICTION STUDY(U) NAVY PERSONNEL RESEARCH AND
DEVELOPMENT CENTER SAN DIEGO CA G L WILCOVE JUN 83

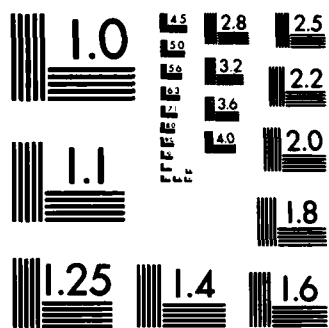
UNCLASSIFIED

NPRDC-SR-83-41

F/G 5/9

NL

END



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

12

NPRDC-SR-83-41 ✓

JUNE 1983

ADA130247

**COMPLETION OF THE FIRST ENLISTMENT BY
FEMALE PERSONNEL: A PREDICTION STUDY**

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED



DTIC
ELECTED
JUL 11 1983
A

**NAVY PERSONNEL RESEARCH
AND
DEVELOPMENT CENTER
San Diego, California 92152**



83 07 08 065

**COMPLETION OF THE FIRST ENLISTMENT BY FEMALE
PERSONNEL: A PREDICTION STUDY**

Gerry L. Wilcove

Reviewed by
Robert Penn

Released by
James F. Kelly, Jr.
Commanding Officer

Navy Personnel Research and Development Center
San Diego, California 92152

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER NPRDC SR 83-41	2. GOVT ACCESSION NO. AD-A130247	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) COMPLETION OF THE FIRST ENLISTMENT BY FEMALE PERSONNEL: A PREDICTION STUDY		5. TYPE OF REPORT & PERIOD COVERED Special Report Nov 1980-May 1981
		6. PERFORMING ORG. REPORT NUMBER 16-81-8
7. AUTHOR(s) Gerry L. Wilcove		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Navy Personnel Research and Development Center San Diego, California 92152		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS ZF63521-021-03.03
11. CONTROLLING OFFICE NAME AND ADDRESS Navy Personnel Research and Development Center San Diego, California 92152		12. REPORT DATE June 1983
		13. NUMBER OF PAGES 19
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Attrition Attitudes Biographical variables Work values Recruitment Screening Selection procedures		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Two questionnaire forms--QUEST 1 and QUEST 2--were developed and one or the other was administered to approximately 1,000 female Navy recruits. The questionnaires included items under eight categories--personal history, female role ideology, mental health, motivation to fail, realistic expectations about the Navy, motivation to enlist, similarity to successful recruits, and occupational needs. In an attempt to predict attrition during the first enlistment, seven scales were developed using validation samples. These scales were scored in three different ways using cross-validation samples.		

DD FORM 1 JAN 73 1473

EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-LR-014-6601

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

and correlation coefficients were computed. Results showed that 13 of 21 scale scores were significantly correlated with attrition, the highest correlation being .25. The practical significance of this correlation was evaluated using Taylor-Russell tables and discriminant analysis.

S/N 0102- LP 014-6601

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

FOREWORD

This research was funded under work unit ZF63-521-021-03.03 (Personnel Assimilation and Supervision). It was initiated because little has been published on factors affecting the attrition rate of enlisted women. The primary consumer for the research is the Office of the Deputy Chief of Operations, Chief of Naval Personnel (OP-135) (Enlisted Programs Implementation Branch).

This report is the second to be published concerning attrition among women first-term enlistees. The research described in the first report (NPRDC SR 79-25) attempted to predict attrition occurring within 18 months of a woman's initial enlistment; and the research described in this report, attrition occurring any time during the first enlistment. No further research is planned.

JAMES F. KELLY, JR.
Commanding Officer

JAMES W. TWEEDDALE
Technical Director

Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	<input type="checkbox"/>
By _____	
Distribution/	
Availability Codes	
Avail and/or	Special
Dist	
A	



SUMMARY

Background and Problem

In the early 1970s, female first-term enlisted attrition exceeded that of men. In the mid 1970s, female attrition decreased to the level of their male counterparts but was still considered to be too high. To address this problem, this Center conducted research that attempted to predict attrition among female first-term enlistees. Two questionnaire forms--called QUEST 1 and QUEST 2--were developed and one or the other was administered to approximately 1,000 female Navy recruits. The questionnaires included items in eight areas, all hypothesized to be related to attrition and all concerned with nonintellective variables--personal history, female role ideology, mental health, motivation to fail, realistic expectations about the Navy, motivation to enlist, similarity to successful recruits, and occupational needs. At the end of 18 months, respondents were identified as an attrite or a survivor. To determine which combinations of items best predicted attrition, responses of attrites and survivors were compared. Results showed that particular item combinations predicted attrition moderately well and in a fairly stable fashion.

Objective

The objective of the effort described herein was to extend the previous effort by determining whether nonintellective variables measured by QUEST 1 and QUEST 2 predicted attrition over the entire span of the first enlistment.

Approach

Records showed that, at the end of the enlistment period (4 years), 41 and 36 percent of the QUEST 1 and 2 samples respectively had attrited. The general approach in the research was to construct validation and cross-validation samples, develop scales on the validation samples (i.e., identify combinations of items that predicted attrition), and test the scales on the cross-validation samples. Approximately 40 percent of the validation and cross-validation samples were attrites.

Seven developmental scales were constructed, three of which applied to women completing QUEST 1, three to women completing QUEST 2, and one to a combined group of QUEST 1 and 2 women. Each of the seven scales was scored in three different ways in the cross-validation samples, yielding 21 scores. Correlational coefficients were computed to determine if these scores could predict attrition well enough to be statistically significant. Taylor-Russell tables published in the research literature and discriminant analysis were used to determine if scores could predict attrition well enough to be significant in a practical sense.

Results and Conclusions

Results were mixed regarding the predictive ability of questionnaire scores. On the positive side, 13 of 21 predictor scores were significantly correlated with attrition, the highest correlation being .25. In a practical sense, all 13 questionnaire scores could be used to identify a set of individuals likely to complete their enlistment. The accuracy of the scores, defined in terms of the number of individuals who actually complete their enlistment, would be greater than procedures based on chance or another concept explained in the report--"base-rate." On the negative side, discriminant analysis suggested that, when the 13 questionnaire scores are used to identify individuals likely to attrite, a large number of this group actually complete their enlistment.

CONTENTS

	Page
INTRODUCTION	1
Background and Problem	1
Objective	2
METHOD	2
Samples	2
Scale Development and Scoring	3
RESULTS	4
DISCUSSION	8
CONCLUSIONS	9
REFERENCES	11
DISTRIBUTION LIST	13

LIST OF TABLES

1. Sample Sizes	2
2. Scales Constructed from Developmental Samples	3
3. Scale Results for Test Samples	5
4. Item Correlations with Criterion for Development and Test Samples	10

LIST OF FIGURES

1. Decision table illustrating use of discriminant analysis to classify women as attrites or survivors	6
2. Women classified as attrites or survivors by discriminant analysis	6
3. Constructing a decision table based on chance	8

INTRODUCTION

Background and Problem

In the early 1970s, female first-term enlisted attrition exceeded that for males. In the mid 1970s, female attrition decreased to the level of their male counterparts but was still considered to be too high (OASD, 1977). To address this problem, the Navy Personnel Research and Development Center undertook a project to identify preenlistment variables that predict attrition among female first-term enlistees during the first 18 months of naval service (Wilcove, Thomas, and Blankenship, 1979). In that project, a review of the research literature on turnover, mental health, sex roles and vocational choice, and interviews with Navy personnel led to the development of questionnaire items representing the following categories:

1. Personal history.
2. Female role ideology.
3. Mental health.
4. Motivation to fail.
5. Realistic expectations about the Navy.
6. Motivation to enlist.
7. Similarity to successful recruits.
8. Occupational needs.

Because of the large number of items, particularly under the mental health and occupational needs categories, two 120-item questionnaire forms--called QUEST 1 and QUEST 2--were developed. Fifty-seven of the items in each form were common; the other 63 were unique.

A total of 997 female recruits entering the Recruit Training Command (RTC), Orlando, Florida over a 3-month period in 1975 completed either QUEST 1 or QUEST 2. Of these, 20 were dropped either because they were in the reserves or had incorrect SSNs, leaving a final sample of 977 (485 QUEST 1 respondents and 492 QUEST 2 respondents). About 18 months later, 204 sample members had attrited and 773 remained in service (survivors).

The relationships between individual items and attrition were examined, and scale analyses were conducted as follows: Half of the attrites and half of the survivors in each of the QUEST 1, QUEST 2, and total samples were assigned to development groups; and the other half, to test groups. Responses of developmental groups were used to construct predictor scales by identifying "key" item responses (i.e., those selected by at least 10 percent more attrites than survivors or vice versa). Scales were validated using the test groups.

Results showed that 38 items (16 on mental health, 10 on occupational needs, 5 on personal history, 4 on motivation to enlist, and 1 each on realistic expectations, female role ideology, and similarity to successful recruits) were significantly related to attrition; however, the strength of these relationships was generally weak. In contrast, scores on some predictor scales yielded appreciably stronger relationships than did individual items.

Wilcove et al. (1979) examined nonintellective variables. Lockman and Lurie (1980) examined the power of mental ability scores to predict attrition by enlisted women. They found that, the lower the mental ability of a woman, the less chance she had of completing the first year of her enlistment. Projected chances of success were reported for various ability levels.

Objective

The objective of the effort described herein was to extend the previous effort by determining whether newly constructed QUEST 1 and QUEST 2 item scales could predict attrition over the entire span of the first enlistment.

METHOD

Samples

No attempt was made to predict certain types of attrition (e.g., discharges due to service-incurred disabilities or financial crises). Thus, 16 recruits who were discharged for these reasons were dropped from the original sample of 977. This left a sample of 961, composed of 473 who had completed QUEST 1 and 488 who had completed QUEST 2. The enlisted survival tracking file (STF), which was developed by the Navy to study attrition and reenlistment (Gay & Borack, 1981, 1982), showed that 41 percent ($N = 194$) of the QUEST 1 sample and 36 percent ($N = 174$) of the QUEST 2 sample failed to complete their first enlistment. The five percent difference in attrition rates for the two samples was insignificant ($z = 1.67$, $p < .10$), suggesting that the two samples represented the same population. The total sample and the QUEST 1 and 2 samples were each randomly divided into a developmental sample (two-thirds of the individuals) and a test sample (one-third of the individuals). About 40 percent of developmental and test sample members were attrites; and 60 percent, survivors. Sample sizes are shown in Table 1.

Table 1
Sample Sizes

Sample	Attrites	Survivors	Total
QUEST 1:			
Developmental	130	186	316
Test	64	93	157
Total	194	279	473
QUEST 2:			
Developmental	116	210	326
Test	58	104	162
Total	174	314	488
Total Sample:			
Developmental	246	396	642
Test	122	197	319
Total	368	593	961

Scale Development and Scoring

The developmental samples were used to identify key response options and the total set of key options constituted a scale. As mentioned, key options are those selected by at least 10 percent more of the survivors than the attrites or vice versa. This minimum difference was needed for statistical significance. Table 2 presents all of the scales identified for the research. (It will be recalled that certain items were common to both questionnaires, and each questionnaire had some items that were unique to it.) As shown, three scales were identified for women completing QUEST 1: Scale 1, composed of key options of unique items; Scale 2, the key options of common items; and Scale 3, the key options of all QUEST 1 items. Corresponding scales were created for QUEST 2 (Scales 4, 5, and 6). Finally, Scale 7, which applies to the total sample, is composed of items common to QUEST 1 and QUEST 2.

Table 2
Scales Constructed from Developmental Samples

Questionnaire Items	QUEST 1 Sample	QUEST 2 Sample	Total Sample
Unique	Scale 1	Scale 4	---
Common	Scale 2	Scale 5	Scale 7
All Items	Scale 3	Scale 6	---

These scales were then tested for their predictive ability using the responses of the test samples, a procedure that reduces the role of chance or luck. Three scoring systems (NAVPERSRANDCEN, 1977) were used to score key responses (options) in a scale, yielding three overall scores for each test sample member:

1. Unit weighting. With this system, a woman in the test sample who selected a key response received a +1 if that response had been selected by 10 percent or more survivors than attrites in the developmental sample or a -1 if it had been selected by 10 percent or more attrites than survivors. When she selected other than a key response, she received a 0. The scores received across items were summed to yield a total scale score.

2. Multiple weighting. With this system, a woman in the test sample who selected a key response received a +1, 2, 3, or 4 if that response had been selected by 10 percent or more survivors than attrites in the developmental sample or a -1, 2, 3, or 4 if it had been selected by 10 percent or more attrites than survivors. Whether she received a 1, 2, 3, or 4 depended on the amount of the percentage difference: A difference between 10 and 19 points was assigned a score of 1; a difference between 20 and 29, a score of 2; a difference between 30 and 39, a score of 3; and a difference of 40 or more, a score of 4. If she selected other than a key response, she received a 0. The scores received across items were summed to yield a total scale score.

3. Percentage difference weighting. With this system, a woman in the test sample who selected a key response received a plus (+) score if that response had been selected by 10 percent or more survivors than attrites in the developmental sample or a minus (-)

score if it had been selected by 10 percent or more attrites than survivors. The amount of the score was equal to the actual difference between the two groups in the developmental sample. If she selected other than a key response, she received a 0. The scores received across items were summed to yield a total scale score.

For all three weighting systems, a constant of 100 was added to each scale score to ensure that it would be positive.

Three point-biserial correlations were computed for each scale when examining the test sample, one correlation for each scoring system. When computing correlations for the test sample, they are referred to as "cross-validation" coefficients. The point-biserial correlations were computed with scale scores as continuous variables and individual status (attrite or survivor) as a dichotomous variable (attrites were coded as 0 and survivors as 1).

In addition to the three correlations, Tilton percentages were computed. They are defined by Tilton (1937) as "the percentage of scores made by one group (i.e., attrites) that could be matched with scores in the other group (i.e., survivors)" (p. 657). The larger the percentage obtained, the less effective the scale is for predicting attrition (i.e., for discriminating between survivors and attrites).

RESULTS

Table 3 provides the cross-validation coefficients and Tilton percentages computed for the test samples on the seven scales. An example helps clarify the table. Scale 1, constructed from the unique items of QUEST 1, produced a coefficient of .063 and a Tilton percentage of 94.9 when using unit weighting. The positive correlation means that, the higher the scale score, the more likely that the woman completed her enlistment. The Tilton percentage of 94.9 means that an attrite's scale score could be matched with a survivor's scale score 94.9 percent of the time. As indicated earlier, the higher the Tilton percentage, the less effective the scale is for predicting attrition. Of the 21 coefficients, 9 are statistically significant at the .05 level; and 4, at the .01 level. The average Tilton percentage for the significant correlations was 85.8.

The two largest coefficients, .25 and .22, were obtained for Scales 2 and 5 respectively. Scale 2 was developed from the common items in QUEST 1; and Scale 5, from the same items in QUEST 2. Those variables that cross-validated best were as follows: marital status and type of relationships typically formed with males (true for both Scale 2 and 5), whether or not a person had a female friend or relative who had been in the military (Scale 2 only), the degree to which a person needed a job (Scale 2 only), whether peers and friends approved or disapproved of Navy enlistment (Scale 5 only), and the need for psychological security (Scale 5 only). Survivors were more likely than attrites to be unmarried at the time of enlistment, to have many male friends as acquaintances rather than a few close male friends, to have a female friend or relative who had been in the military, to have been employed at the time of enlistment, to have received the support of friends and peers to enlist, and to need the psychological security they could find in the Navy.

For all of the scales, multiple weighting produced the same coefficient as did unit weighting. Unless a difference of 20 percent or more is obtained for at least one option in a scale, unit and multiple weighting produce the same results.

Table 3
Scale Results for Test Samples

Scale/Scoring System	Cross-validation Coefficient ^a	Tilton Percentage ^b
QUEST 1 Test Sample (N = 157)		
Scale 1 (unique items):		
Unit weighting	.063	94.9
Multiple weighting	.063	94.9
Percentage difference weighting	.109	91.1
Scale 2 (common items):		
Unit weighting	.162*	86.5
Multiple weighting	.162*	86.5
Percentage difference weighting	.249**	79.0
Scale 3 (all items):		
Unit weighting	.171*	86.0
Multiple weighting	.171*	86.0
Percentage difference weighting	.176*	85.6
QUEST 2 Test Sample (N = 162)		
Scale 4 (unique items):		
Unit weighting	.010	99.2
Multiple weighting	.010	99.2
Percentage difference weighting	.069	94.4
Scale 5 (common items):		
Unit weighting	.145*	87.8
Multiple weighting	.145*	87.8
Percentage difference weighting	.223**	81.2
Scale 6 (all items):		
Unit weighting	.111	90.8
Multiple weighting	.111	90.8
Percentage difference weighting	.166*	86.3
Total Test Sample (N = 319)		
Scale 7 (common items):		
Unit weighting	.163**	86.4
Multiple weighting	.163**	86.4
Percentage difference weighting	.128*	89.4

*p < .05.

**p < .01.

^aCoefficients are point-biserial correlations. Positive correlations mean that the higher the scale score, the more likely that the enlistment was completed.

^bThe Tilton statistic represents the percentage of scale scores for the attrites that are duplicated by scores of the survivors.

For Scale 7, a correlation of .163 was obtained by unit weighting the common items for the total test sample (QUEST 1 and 2 respondents combined). Some might expect this correlation to lie somewhere between those obtained for Scales 2 and 5, developed from the common items in QUEST 1 and 2 (.162 and .145 respectively). In actuality, however, this would happen only if the key options for the QUEST 1 and 2 samples were the same, which was not the case.

The percentage difference weighting score for Scale 2 (common items in QUEST 1) produced the highest correlation (.249). Generally, it is considered that the practical significance of a correlation increases as the correlation increases. An alternate way to assess practical significance is with linear discriminant analysis, which produces a decision table (see Figure 1). Using this technique, percentage difference scores served as the predictor, and an optimal cutoff was identified for classifying women in the QUEST 1 developmental sample as attrites or survivors (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975). Those in the QUEST 1 test sample below this cutoff were classified as attrites; and those above the cutoff, as survivors. The resulting decision table, which is presented as Figure 2, shows that 21 women who were classified as attrites actually attrited and 73 who were classified as survivors actually completed their first enlistment. In other words, 94 of 157 women or 59.9 percent were classified correctly by the discriminant analysis.

		Predicted Groups		
		Attrites	Survivors	
Actual Groups	Attrites	Number of women who attrited from the Navy and were <u>ACCURATELY CLASSIFIED</u> by the discriminant analysis as attrites.	Number of women who attrited from the Navy but were <u>ERRONEOUSLY CLASSIFIED</u> by discriminant analysis as survivors.	Statistics: 1. Total number and the percentage of the total sample who are actual attrites. 2. Total number and the percentage of the total sample who are actual survivors. 3. Total
	Survivors	Number of women who completed their first enlistment but were <u>ERRONEOUSLY CLASSIFIED</u> by discriminant analysis as attrites.	Number of women who completed their first enlistment and were <u>ACCURATELY CLASSIFIED</u> by discriminant analysis as survivors.	
Statistics:		1. Total number and the percentage of the total sample who were classified as attrites.	2. Total number and the percentage of the total sample who were classified as survivors.	3. Total

Figure 1. Decision table illustrating use of discriminant analysis to classify women as attrites or survivors.

		Predicted Groups		
		Attrites	Survivors	
Actual Groups	Attrites	21	43	64 (40.8%)
	Survivors	20	73	93 (59.2%)
		41 (26.1%)	116 (73.9%)	157 (100%)

Figure 2. Women classified as attrites or survivors by discriminant analysis.

To determine whether or not these results are practically significant, either a "base-rate" or a chance procedure can be used as a basis for comparison. Using a base-rate procedure, all individuals in the test sample are classified as survivors or attrites, depending on which group is the most predominant in the population. Since 65 percent of Navy women complete their enlistment, all 157 members of the QUEST 1 test sample were classified as survivors, as this should produce a greater proportion of hits than classifying them as attrites. Although this meant that the 64 women or 40.8 percent who attrited would be classified incorrectly, the 93 or 59.2 percent who did survive would be classified correctly, compared to 94 of 157 women, or 59.9 percent, when using Scale 2 in a discriminant analysis. Since only one additional person was classified correctly using this scale, it is tentatively concluded that the relationship between Scale 2 and attrition is not practically significant.

To determine whether the hit rate from a chance procedure would be as accurate as that obtained using discriminant analysis, the following procedure could have been used:

1. Place 157 pieces of paper in a hat, with 64 labeled as attrites and 93, as survivors (the same numbers of women in the QUEST 1 test sample who attrited and completed their enlistment respectively).
2. Randomly select 41 and classify them as attrites and the remaining 116, as survivors (the same numbers classified as such by the discriminant analysis).
3. Compute the numbers of correct and incorrect classifications made using this random procedure.
4. Compare the percent correctly classified to that obtained from the discriminant analysis.

For this study, the mathematical equivalent of this procedure was used (see Figure 3), and 54.7 percent (86 of 157 women) were classified correctly. Since it is unlikely that the difference between this percentage and that found using discriminant analysis (i.e., 59.9%) could be replicated consistently in other samples ($z = 1.24$, $p < .20$), it is once again tentatively concluded that the relationship between Scale 2 and attrition is not practically significant.¹

Since the use of scales was unsuccessful, another approach was attempted.² The QUEST 1 developmental sample was used to identify items with key responses and to conduct a multiple regression analysis. All QUEST 1 items were considered. Identified items were used as predictors, with key responses scored as -1 or +1 and nonkey responses scored as zero. Weights were established for an optimal subset of items and an optimal cutoff established. Applying this information to the QUEST 1 test sample yielded a decision table with 95 hits, compared to 94 produced by Scale 2. In short, this technique did not differ in its predictive effectiveness from the scale approach.

¹A nonsignificant result was also obtained when the Kappa statistic (Cohen, 1960) was calculated ($K = .120$, $z = .100$) for the discriminant analysis results (Figure 2). An insignificant Kappa ($K = .143$, $z = .119$) was also obtained when the optimal cut score for classifying women was determined on the test sample.

²Suggested by Dr. Jules Borack, NAVPERSRANDCEN.

		Predicted Groups		
		Attrites	Survivors	
Actual Groups	Attrites	.408 Proportions of actual attrites X MULTIPLIED BY .261 Proportion of women classified by discriminant analysis as attrites X MULTIPLIED BY 157 Number of women in the total sample = 16.7 or 17	.408 Proportion of actual attrites X MULTIPLIED BY .739 Proportion of women classified by discriminant analysis as survivors X MULTIPLIED BY 157 Number of women in the total sample = 47.3 or 47	64 (40.8%)
	Survivors	.592 Proportion of actual survivors X MULTIPLIED BY .261 Proportion of women classified by discriminant analysis as attrites X MULTIPLIED BY 157 Number of women in the total sample = 24.2 or 24	.592 Proportion of actual survivors X MULTIPLIED BY .739 Proportion of women classified by discriminant analysis as survivors X MULTIPLIED BY 157 Number of women in the total sample = 68.7 or 69	93 (59.2%)
		41 (26.1%)	116 (73.9%)	157 (100%)

Figure 3. Constructing a decision table based on chance.

DISCUSSION

Cross-validation coefficients of .25 and .22 were obtained for the QUEST 1 and 2 samples respectively, when the common items were scored with percentage difference weights. On the other hand, a cross-validation correlation of only .13 was obtained when the same items and scoring procedure were invoked for the total sample. It is unclear whether this lower correlation simply is more accurate because of the larger N, or whether the QUEST 1 and 2 samples could not be legitimately combined because of differences in the questionnaire forms, the people who completed them, etc.

Decision table analyses yielded results that were insignificant in a practical sense. These types of analyses are designed to minimize two types of errors: (1) classifying an individual as a survivor who was, in fact, an attrite, and (2) classifying an individual as an attrite who was, in fact, a survivor. The insignificant results were due primarily to the second type of error. However, when screening applicants for a job, organizations are primarily concerned with the first type of error. Taylor-Russell tables published by Abrahams, Alf, and Wolfe (1971) permit estimates to be made, based on the cross-validation correlations, of the attrition rate that would result if particular scales, scored in particular ways, were used to screen female applicants for naval service. These estimates represent a measure of practical significance when compared with the attrition rate present in the total research sample as a result of existing selection procedures. Although .25 and .22 were the largest cross-validation coefficients obtained, they may be idiosyncratic to the QUEST 1 and 2 samples respectively. It can be argued that the correlation of .163 obtained for Scale 7 (i.e., common items scored with unit or multiple

weights) represents the most stable predictor--this correlation is among the highest and is based on the largest N. Assuming that only 1 female applicant out of 10 is actually accepted into Navy enlisted ranks,³ Taylor-Russell tables predict that Scale 7 would produce an attrition rate of 28 percent. This compares with 38 percent for the total sample, a projected reduction of 10 percentage points. This result, while encouraging, must be considered tentative for the following reasons:

1. The N in the research was small, compared to the total number of women accepted into the Navy in a year's time.
2. The samples may not be representative of the population, since data were collected over a 3-month period to accommodate training schedules.
3. The research needs to be replicated on more contemporary samples.

CONCLUSIONS

Results were mixed regarding the usefulness of nonintellective questionnaire variables for predicting attrition during the first enlistment. Some evidence was obtained suggesting that there may be some merit in using questionnaire scales to select women for Navy enlistment (i.e., attrition might be reduced). On the other hand, results also suggested that fairly large numbers of individuals would be rejected who would otherwise complete their first enlistment. This latter result may have been due to the specific analytical methods used in the research. Perhaps other techniques would have been more successful. For example, response options of many questionnaire items could have been coded on an "a priori" basis to reflect an underlying continuum. Suppose a questionnaire item read, "How happy are you about the prospect of wearing a Navy uniform?" and the three response options were (a) happy, (b) neither happy nor unhappy, and (c) unhappy. Coding the response options on an a priori basis would produce the following scheme: option a = 1, option b = 2, option c = 3. The most promising items then could be identified through a multiple regression analysis and cross-validated. However, results of exploratory work using this approach (Table 4) suggest that this approach would be no more productive than those used in the research, since zero-order item-attrition correlations were often found to be unstable from one sample to another.

³Actual statistics could not be found. However, two different sources (chief recruiter at Navy Recruiting Headquarters, San Diego and former recruiter at Navy Recruiting Headquarters, Washington, DC) estimated, based on personal experience, that a selection ratio of 1:10 prevails.

Table 4
Item Correlations with Criterion for Development
and Test Samples

Item Number ^a	Item Category	Correlation with Criterion ^b	
		Developmental Sample	Test Sample
QUEST 1 (N = 473)			
116	Enlistment motivation	.223	-.045
53	Mental health	.185	-.004
21	Personal history	.158	.078
67	Mental health	.156	.129
68	Mental health	.150	.040
5	Personal history	-.150	.014
56	Mental health	.147	.118
104	Enlistment motivation	-.132	-.037
2	Personal history	-.131	.172
46	Mental health	.125	.115
QUEST 2 (N = 488)			
71	Occupational needs	-.210	.061
29	Personal history	.193	.087
97	Motivation to fail	-.176	-.132
78	Occupational needs	.155	-.045
90	Occupational needs	.153	-.109
99	Motivation to fail	-.152	-.004
33	Realistic expectations	.142	.054
11	Personal history	-.138	.048
115	Enlistment motivation	.132	.057
Total Sample (N = 961) ^a			
Procedure A:			
19	Personal history	.150	.077
114	Enlistment motivation	.134	.083
Procedure B:			
29	Personal history	.148	-.022
97	Motivation to fail	.132	.073
33	Realistic expectations	.116	-.036
106	Enlistment motivation	-.114	-.082
115	Enlistment motivation	.103	.097
117	Enlistment motivation	.101	.059

^aItems are listed in order of their correlation with the criterion in the developmental samples.

^bCorrelations are Pearson r's; that is, a plus (minus) correlation means that individuals selecting the large numerically-coded responses of an item tend to be survivors (attrites).

^cWith procedure A, the QUEST 1 sample was the developmental sample; and the QUEST 2 sample, the test sample. The opposite was true for procedure B.

REFERENCES

- Abrahams, N. M., Alf, E. F., & Wolfe, J. H. Taylor-Russell tables for dichotomous criterion variables. Journal of Applied Psychology, 1971, 55, 449-457.
- Cohen, J. A coefficient of agreement for nominal scales. Educational and Psychological Measurement, 1960, Vol. XX, 37-46.
- Gay, K. W., & Borack, J. I. The enlisted survival tracking file (STF) (NPRDC Tech. Note 81-11). San Diego: Navy Personnel Research and Development Center, April 1981.
- Gay, K. W., & Borack, J. I. The enlisted survival tracking file (STF): A revision (NPRDC Tech. Note 82-27). San Diego: Navy Personnel Research and Development Center, September 1982. (AD-A119 717)
- Lockman, R. F., & Lurie, P. M. A new look at success chances of recruits entering the Navy (SCREEN) (CRC 425). Alexandria, VA: Center for Naval Analyses, February 1980.
- NAVPERSRANDCEN Computer Program Library Manual. San Diego: Navy Personnel Research and Development Center, April 1977.
- Nie, N. H., Hull, C. H., Jenkins, J. G., Steinbrenner, K., & Bent, D. H. SPSS: Statistical package for the social sciences (Second Edition). New York: McGraw-Hill, 1975.
- Office of the Assistant Secretary of Defense. Use of women in the military (Rep. No. 21). Author, Washington, DC: May 1977.
- Tilton, J. W. The measurement of overlapping. Journal of Educational Psychology, 1937, 28, 656-662.
- Wilcove, G. L., Thomas, P. J., & Blankenship, C. The use of preenlistment variables to predict the attrition of Navy female enlistees (NPRDC Spec. Rep. 79-25). San Diego: Navy Personnel Research and Development Center, September 1979.

DISTRIBUTION LIST

Deputy Assistant Secretary of Defense (Equal Opportunity) (OASD(M,RA&L))
Executive Secretary, Defense Advisory Committee on Women in the Service (DACOWITS)
Director of Manpower Analysis (ODASN(M))
Chief of Naval Operations (OP-01), (OP-11), (OP-12) (2), (OP-13), (OP-115) (2), (OP-140F2)
Chief of Naval Material (NMAT 05)
Chief of Naval Research (Code 200), (Code 442), (Code 442PT)
Chief of Information (OI-213)
Commandant of the Marine Corps (MPI-20)
Commander in Chief, United States Naval Forces, Europe (2)
Comander Naval Military Personnel Command (NMPC-013C)
Commander Navy Recruiting Command
Commanding Officer, Office of Naval Research Branch Office, Chicago (Coordinator for Psychological Sciences)
Officer in Charge, BUMED East Coast Equal Opportunity Program Detachment
Commander, Army Research Institute for the Behavioral and Social Sciences, Alexandria (PERI-ASL), (PERI-ZT)
Chief, Army Research Institute Field Unit—USAREUR (Library)
Chief, Army Research Institute Field Unit, Fort Harrison
Commander, Air Force Human Resources Laboratory, Brooks Air Force Base (Scientific and Technical Information Office)
Commander, Air Force Human Resources Laboratory, Williams Air Force Base (AFHRL/OT)
Director, Defense Equal Opportunity Management Institute, Patrick Air Force Base
Director, Science and Technology, Library of Congress
Defense Technical Information Center (DDA) (12)

